SANBORN HEAD
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Mr. Kevin Bilash
USEPA Region III
Land, Chemicals & Redevelopment Division 3LD20
1650 Arch Street
Philadelphia, PA 19103

June 30, 2022
File No. 4862.04

Re: Marcus Hook Industrial Complex
Monthly Progress Report – June 2022
Area of Interest 7
Marcus Hook, PA

Dear Mr. Bilash:

This monthly progress report is being submitted on behalf of the Evergreen Resource Management Operations (Evergreen) for AOI 7 at the Marcus Hook Industrial Complex (MHIC) in Marcus Hook, Pennsylvania. On December 9, 2021, a Revised Interim Measures (IM) Workplan was submitted to the United States Environmental Protection Agency (USEPA) to address arsenic in the subsurface at AOI 7. The IM Workplan was approved by the USEPA on February 15, 2022. The discussion below provides an update on IM pre-design investigation (PDI) activities.

Activities completed this reporting period

The field activities that were completed during this reporting period (June 2022) include collection of groundwater samples at MW-560D, MW-606S, MW-608D, and MW-609D and Bench Scale Treatability Study activities that occurred in the treatability lab at Terra Systems, Inc. (Terra Systems) in Claymont, Delaware. Details for these activities are presented below. Note that the results of the treatability testing will be submitted in a future progress report once the Bench Scale Treatability Study is completed.

- Data validation was completed on all soil samples collected during the April 2022 and May 2022 drilling events for arsenic and iron. The validated data is included as Table 1 attached.
- On June 3, 2022, Terra Systems homogenized five individual groundwater samples from MW-56D, MW-560D, MW-606S, MW-608D, and MW-609D for use in the Bench Scale Treatability Study. Terra Systems sent a portion of each of the homogenized samples to SGS North America, Inc (SGS) of Dayton, NJ for baseline arsenic, iron, manganese, phosphate, and sulfate analysis. Analyses for sulfide, pH and ORP for each of these homogenized samples were conducted at the Terra Systems laboratory.
- On June 9, 2022, groundwater samples were collected from MW-608D and MW-609D with HydraSleeves at 35 feet below ground surface (ft bgs) and 41 ft bgs in each well to be analyzed at SGS laboratories for:

- Dissolved arsenic and iron analysis
- Sulfate analysis
- Sulfide analysis

- On June 10, 2022 and June 13, 2022, alkaline titration tests were completed at the treatability laboratory for the following soil/well pairs to determine the calcium hydroxide dosages at pH 8, 10 and 12 for the reagent screening test portion of the Bench Scale Treatability Study. Titration tests were also completed for the same pairs to determine the iron sulfide dosages.

  - MW-608D soil and MW-608D groundwater
  - MW-609D soil and MW-609D groundwater
  - AOI7-BH-22-001 soil and MW-56D groundwater
  - MW-560D soil and MW-560D groundwater
  - MW-608D soil and MW-606S groundwater.

- On June 14, 2022, reagent screening tests (calcium polysulfide, ion exchange resin, hydrated lime, and FerroBlack) were prepared and performed in accordance with the Revised IM Workplan for the following soil/well pairs:

  - MW-608D soil and MW-608D groundwater
  - MW-609D soil and MW-609D groundwater
  - AOI7-BH-22-001 soil and MW-56D groundwater

- On June 23, 2022, preliminary sampling was conducted for the Bench Scale Treatability reagent screening tests for the AOI7-BH-22-001 soil and MW-56D groundwater pair.

- SGS laboratory analysis of the MW-560D and MW-606S homogenized samples (sent out on June 3, 2022 by Terra Systems) reported the dissolved arsenic results from both wells as significantly lower than the arsenic results collected in May 2022 (which were reported in the May IM Progress Report) due to potential exposure to oxygen at the treatability laboratory. Therefore, on June 28, 2022, additional groundwater samples were recollected from MW-560D and MW-606S for the Bench Scale Treatability Study to be analyzed at SGS laboratories for dissolved arsenic analysis. The recollection of the samples included collection of the samples in individual 1L amber jars (10 total jars for each sample) that were continuously purged with nitrogen and filled to the top with no bubbles remaining in the bottleware so no oxygen could change the geochemistry in the groundwater. The bottles were sealed with parafilm.

- The soil oxidant demand (SOD) treatability test was not conducted due to the high oxygen demand (biological oxygen demand (BOD), chemical oxygen demand (COD), total organic carbon (TOC)) found in the Bench Scale Treatability Study soil samples that would render it an inefficient treatment technology for arsenic removal in groundwater. As discussed in the Revised IM Workplan, this test would not be conducted if elevated BOD, COD, and/or TOC was observed.

Activities planned for the next reporting period

The activities planned for the next reporting period (July 2022) include the following Bench Scale Treatability Study activities, as described in the Revised IM Workplan:

- Reagent screening activities for the following soil/well pairs in accordance with the IM Workplan:
  - MW-560D soil and MW-560D groundwater
  - MW-608D soil and MW-606S groundwater
- Bench Scale Treatability Study modifications, if necessary, based on all reagent screening results, as described in the IM Workplan.
- Rebound testing, as described in the IM Workplan.

Deviation from approved activities this reporting period

There were no deviations from the approved activities for this reporting period.

Deviation from approved schedule

There were no schedule deviations during this period. The schedule for the major milestones is provided below and the detailed schedule is included in Attachment A.

Task	Schedule
PDI Activities	3/2022 – 5/2022
Bench Scale Treatability Testing	5/2022 – 8/2022
Pilot Testing	8/2022 – 11/2022
IM Performance Monitoring	10/2022 – 11/2023

Very truly yours,
SANBORN, HEAD & ASSOCIATES, INC.

Colleen Costello, PG
Senior Vice President

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ATTACHMENTS
Attachment A – Interim Measures Implementation Schedule
Table 1 – Summary of Metals Analytical Results - Soil

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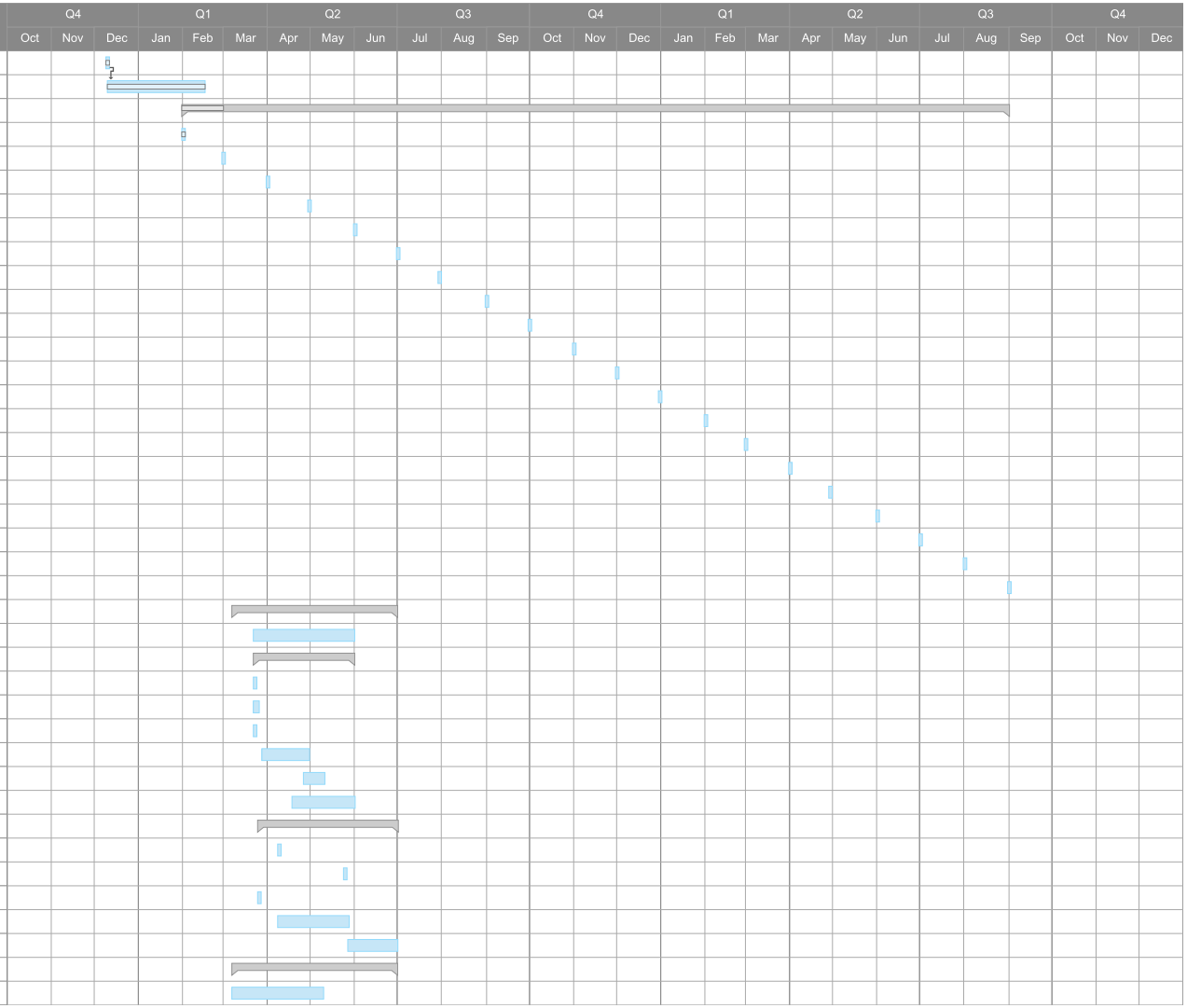
Attachment A

Interim Measures Implementation Schedule

Evergreen

Marcus Hook, Pennsylvania

Task Name	Start	Finish
Submit IM Workplan to EPA	12/09/21	12/09/21
EPA Approval of IM Workplan	12/10/21	02/15/22
Monthly Report to EPA	01/31/22	08/31/23
January 2022 Monthly Report	01/31/22	01/31/22
February 2022 Monthly Report	02/28/22	02/28/22
March 2022 Monthly Report	03/31/22	03/31/22
April 2022 Monthly Report	04/29/22	04/29/22
May 2022 Monthly Report	05/31/22	05/31/22
June 2022 Monthly Report	06/30/22	06/30/22
July 2022 Monthly Report	07/29/22	07/29/22
August 2022 Monthly Report	08/31/22	08/31/22
September 2022 Monthly Report	09/30/22	09/30/22
October 2022 Monthly Report	10/31/22	10/31/22
November 2022 Monthly Report	11/30/22	11/30/22
December 2022 Monthly Report	12/30/22	12/30/22
January 2023 Monthly Report	01/31/23	01/31/23
February 2023 Monthly Report	02/28/23	02/28/23
March 2023 Monthly Report	03/31/23	03/31/23
April 2023 Monthly Report	04/28/23	04/28/23
May 2023 Monthly Report	05/31/23	05/31/23
June 2023 Monthly Report	06/30/23	06/30/23
July 2023 Monthly Report	07/31/23	07/31/23
August 2023 Monthly Report	08/31/23	08/31/23
PDI	03/07/22	06/30/22
PDI Mobilization	03/22/22	05/31/22
Sediment and Porewater Sampling	03/22/22	05/31/22
Field Mobilization	03/22/22	03/22/22
Collection of sediment samples and grab porewater samples	03/22/22	03/25/22
Collection of DGT porewater samples	03/22/22	03/23/22
Laboratory Data Analysis	03/28/22	04/29/22
Data Validation	04/26/22	05/10/22
Data Evaluation	04/18/22	05/31/22
GW Elevation and GW Flow Evaluation	03/25/22	06/30/22
Installation of Transducers	04/08/22	04/08/22
Deployment of Groundwater Flow Meter	05/24/22	05/24/22
Install stilling well	03/25/22	03/25/22
Data Collection	04/08/22	05/27/22
Data Evaluation	05/27/22	06/30/22
Monitoring Well Installations, Soil Borings and Soil Sampling	03/07/22	06/30/22
Obtain Access to Honeywell Property	03/07/22	05/09/22



Attachment A

Interim Measures Implementation Schedule

Evergreen

Marcus Hook, Pennsylvania

Task Name	Start	Finish
Delaware Well Permits	03/21/22	04/01/22
Utility Clearance	03/25/22	03/25/22
Soil Borings, Well Installations and Soil Sampling	04/04/22	05/13/22
Laboratory Data Analysis	04/11/22	05/27/22
Data Validation	05/27/22	06/10/22
Well Development	04/07/22	05/13/22
Well and Boring Survey	05/24/22	05/24/22
Data Evaluation	04/11/22	06/30/22
Groundwater Sampling	05/24/22	06/30/22
Groundwater Sampling	05/24/22	05/27/22
Laboratory Data Analysis	05/27/22	06/10/22
Data Validation	06/10/22	06/23/22
Data Evaluation	06/10/22	06/30/22
Bench Scale Treatability Test	05/31/22	09/02/22
Baseline Characterization	05/31/22	06/13/22
Titration Test	06/10/22	06/13/22
Reagent Screening	06/14/22	07/15/22
Test Setup	06/14/22	06/14/22
Initial Test	06/17/22	06/21/22
Modification Test (If Needed)	06/30/22	07/13/22
Evaluation	07/11/22	07/15/22
Rebound Test	07/18/22	08/19/22
Reactor Setup	07/18/22	07/18/22
First Sampling and Replenishing	07/25/22	07/25/22
Second Sampling and Replenishing	08/01/22	08/01/22
Final Sampling	08/08/22	08/08/22
Evaluation	08/08/22	08/19/22
Bench-scale Study Report	08/22/22	09/02/22
Pilot Test	09/05/22	10/11/23
Pilot Study Design	09/05/22	09/26/22
Pilot Study Implementation	09/27/22	11/21/22
Permit	09/27/22	10/17/22
Injection Preparation	10/18/22	10/31/22
Injection Activities	11/01/22	11/21/22
Pilot Study Monitoring	11/01/22	10/11/23
Baseline Sampling	11/01/22	11/03/22
First Performance Monitoring	01/09/23	01/11/23
Second Performance Monitoring	04/10/23	04/12/23
Third Performance Monitoring	07/10/23	07/12/23
Fourth Performance Monitoring	10/09/23	10/11/23
CMS	10/16/23	11/20/23
Design of Final Remedy	10/16/23	11/17/23
Submittal of CMS	11/20/23	11/20/23

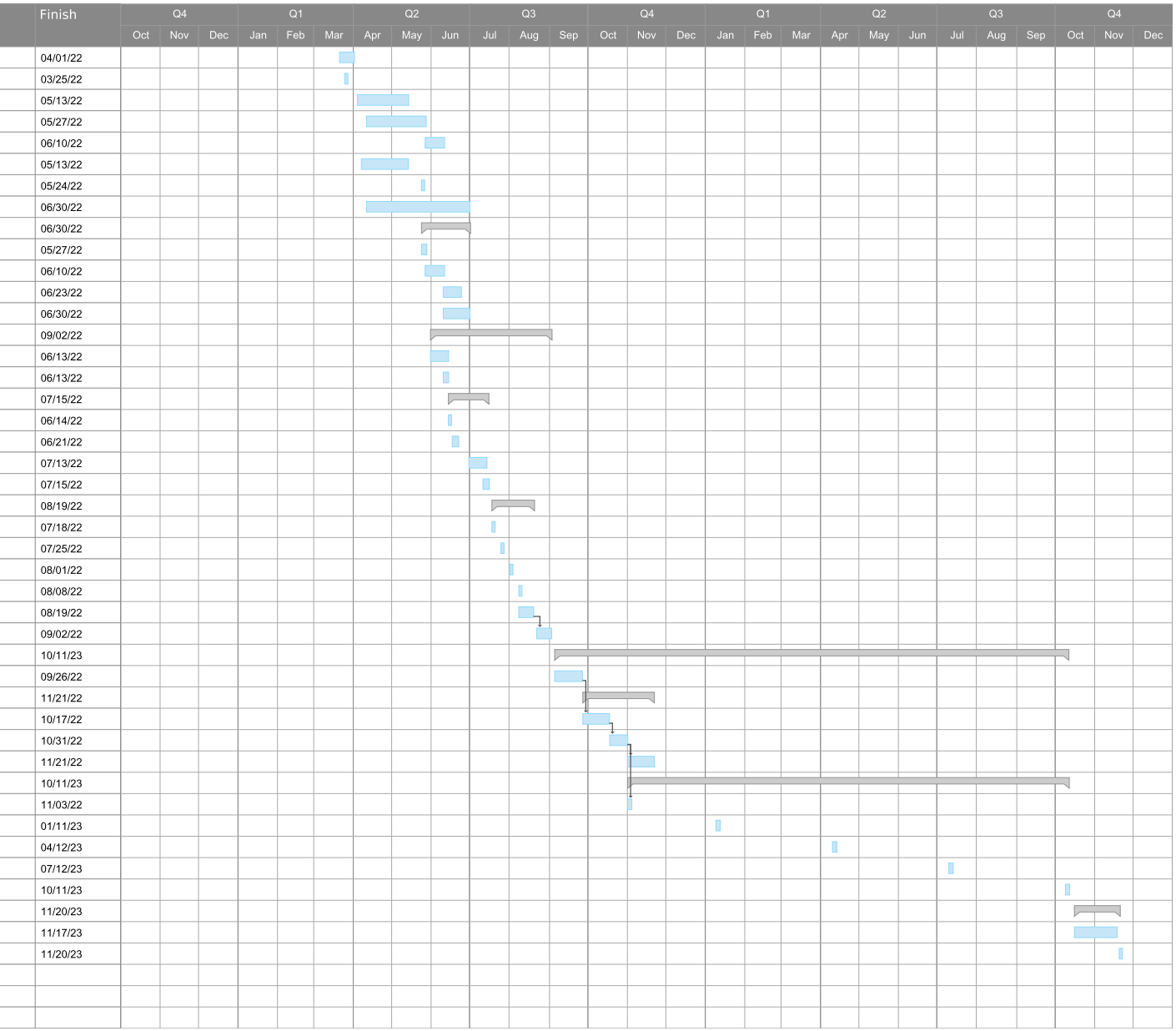


Table 1
Summary of Metals Analytical Results - Soil
AOI 7, Marcus Hook Industrial Complex (MHIC)

Sample Location	Sample Date	Sample Type	Start Depth (ft)	End Depth (ft)	Arsenic		Iron	
					mg/kg		mg/kg	
				USEPA RSLs	**3**		**82,000**	
AOI7-BH-22-001	4/4/2022	N	0	5	<4.4		32,300	J
	4/4/2022	N	5	10	**9.2**		17,700	J
	4/4/2022	N	10	15	**6.9**		12,400	J
	4/4/2022	N	15	20	**12.6**		27,900	J
	4/4/2022	N	20	25	**8,270**		23,600	J
	4/4/2022	N	25	30	**1,310**		32,200	J
MW-559D	5/11/2022	N	0	5	**473**	J	**100,000**	
	5/11/2022	N	5	10	**422**	J	**192,000**	
	5/11/2022	N	10	15	**9,890**	J	50,500	
	5/11/2022	N	15	20	**719**	J	**158,000**	
	5/11/2022	N	20	25	**1,770**	J	37,700	
	5/11/2022	N	25	30	**12.2**	J	31,300	
MW-560D	5/11/2022	N	0	5	**239**	J	47,000	
	5/11/2022	N	5	10	**2,890**	J	**101,000**	
	5/11/2022	N	10	15	**6,940**	J	16,300	
	5/11/2022	N	15	20	**10,800**	J	30,500	
	5/11/2022	N	20	25	**488**	J	37,900	
	5/11/2022	N	25	30	**105**	J	16,900	
MW-608D	4/4/2022	N	0	5	**85.2**		34,800	J
	4/6/2022	N	5	10	**38.3**		23,700	
	4/6/2022	N	10	15	**33.4**		24,600	
	4/6/2022	N	15	20	**21.1**		37,200	
	4/6/2022	FD	15	20	**27.3**		43,800	
	4/6/2022	N	20	25	**10.7**		21,000	
	4/6/2022	N	25	30	**112**		28,000	
	4/6/2022	N	30	35	**14,800**		18,800	
	4/6/2022	N	35	40	**10,900**		24,100	
MW-609D	4/4/2022	N	0	5	**153**		34,600	J
	4/5/2022	N	5	10	**9.3**		16,800	J
	4/5/2022	N	10	15	**13.8**		30,300	J
	4/5/2022	N	15	20	**409**		74,700	J
	4/5/2022	N	20	25	**5.8**		16,200	J
	4/5/2022	N	25	30	**399**		**144,000**	**J**
	4/5/2022	N	30	35	**10,400**		24,400	J
	4/5/2022	N	35	40	**1,330**		26,600	J
Equipment Blank (mg/L)	4/6/2022	EB	–	–	<0.003		<0.1	

Notes:
1. Samples were collected by Sanborn Head personnel on the dates indicated and were analyzed by SGS North America, Inc. (SGS) of Dayton, New Jersey for arsenic by United States Environmental Protection Agency (USEPA) Method 6010D. A sample type of "N" indicates a normal sample. A sample type of "FD" indicates a field duplicate sample. A sample type of "EB" indicates an equipment blank sample.

2. "USEPA RSLs" are the USEPA Regional Screening Levels (TR=1e-6, THQ=0.1) for industrial soils (May 2022 - https://www.epa.gov/risk/regional-screening-levels-rsls-generic-tables).

3. **Bolded** values indicate an exceedance of the USEPA RSL.
"<" indicates the analyte is not detected above laboratory reporting limits.
"ft" indicates feet.
"J" indicates the result is estimated and may have an indeterminate bias.
"NS" indicates no standard.
"mg/kg" indicates milligrams per kilogram.
"mg/L" indicates milligrams per liter.

4. Data validation was performed on the samples provided in this table by Environmental Standards, Inc. of Valley Forge, Pennsylvania. All results are considered acceptable, with the understanding of the potential uncertainty (bias) in the qualified results. In some cases, Environmental Standards assigned the qualifiers noted above to the data. Refer to the Data Validation Summary Reports for further details.